

KENTUCKY SPRING TURKEY HUNTING REPORT – 2018

by Zak Danks, KDFWR Turkey Program Coordinator



This report summarizes turkey harvest data from the 2018 spring hunting season. Youth season was April 7-8 (2 days) and regular season was April 14-May 6 (23 days) in all 120 counties. Appendices provide additional information.

Spring Season Highlights

- Overall reported harvest (27,151) was down 18% from last spring, but less so compared to 5-, 10-, and 13-year averages (Table 1; Fig. 1, 2).
- Harvest was down across all commission districts and wildlife regions (Table 1; Fig. 3, 4).
- A lower harvest was expected given consecutive bad-hatch years brought about by heavy rain during spring nesting and brood-rearing periods over most of the state (Fig. 5).
- Cold temperatures and rain in western Kentucky kept many hunters out of the woods, reducing opening weekend's typically high proportion of the overall harvest (Tables 1, 2; Fig. 7).
- Harvest improved as weather improved on the 2nd weekend and in week 3, but not enough to compensate for the low opening weekend harvest (Fig. 1, 7).
- 75% of hunters harvested 1 turkey vs. 25% who harvested 2 turkeys, and 18% of hunters were successful (harvested at least 1 turkey; Fig. 6.).
- 4 southern counties topped 500 turkeys killed whereas turkeys killed per square mile was highest in northern and central counties (Table 3; Fig. 8, 9).
- At least 26 turkeys were taken on 10 WMAs and the Daniel Boone National Forest (Table 4).
- 5- and 10-year trends show 43 and 21 counties with a declining rate of harvest ($<-2.5\%/year$), respectively, but most counties have been stable (Fig. 10, 11).
- The percentage of jakes harvested was noticeably higher at Clay WMA compared to other public lands and statewide (Tables 4, 5; Fig. 12). This may indicate better reproduction there compared to other areas, likely due to intensive habitat management for quail that has improved nesting and brood cover for turkeys as well. Habitat improvement can dampen the effects of bad weather and predation on reproduction.

Turkey Program Notes

- To better assess population trends, the turkey program conducted a turkey-health check station covering Livingston and Crittenden Counties, a gobbler hunter survey, and an internet post-season hunter survey.
- The primary objective of the check station was to gather a sample of hunter-harvested turkeys to examine their overall condition and check for parasites and disease. We stress that we have no reason to assume any particular disease agent capable of causing widespread mortality and population decline will be detected. However, this effort would provide information on any disease agent that might be present. (See Appendix A for a brief summary of some diseases of interest.)

- A major objective of both the gobble hunter log and the online survey is to gather data on hunter effort, which would allow us to express spring turkey harvest relative to hunters' time spent hunting (birds harvest per hunting trip or hunter-hours per turkey harvested). While this may seem simple or minor, it is an important piece of information commonly used to assess turkey population trends. These surveys also allow us to gather information hunter opinions, insights, and observations. To date we have nearly 11,000 responses to the online survey. Results will be published as soon as data analysis is completed.
- I hope to coordinate a turkey team/committee composed of personnel from multiple division within the department. Similar to the deer group, the purpose would be get staff input and involvement with turkey management in a construction way. Hopefully I can gather a meeting this summer. Further plan is to convene an outside group of stakeholders, with NWTF and universities being prominent partners.
- I am evaluating various potential research projects to be conducted within the agency, pending funding. This may involve capturing, banding, and transmitting turkeys on various sites to gather preliminary movement, survival, and habitat data using GPS or VHF collars. I have discussion potential collaboration with UK on a raccoon/small mammal crop depredation project to evaluate hen nesting loss or other things.
- Recent research from Missouri using spatial population reconstruction modeling (as with our elk herd) provides evidence that as turkey populations have stabilized there, large annual fluctuations in turkey numbers can be expected. They recommend consistent hunting regulations rather than short-term reactionary changes. Given uncertainty about the trajectory of Kentucky's turkey population, unknown effect levels of habitat, predators, poaching, and disease, and the potential for density dependence at local and statewide levels, our current regulations are most prudent until specific data indicate otherwise.

Summary

- 2018 spring harvest was down but not that bad considering the bad weather.
- Populations are stable in most counties. A few counties show declines, but evidence from other states suggest short-term fluctuations as populations stabilize with habitat carrying capacity.
- Brood production has been variable over the past decade, so we need a good hatch this summer to fuel population growth. That depends largely on having good weather in May and June.
- Intensive habitat management is the best tool to improve turkey productivity.
- We have no data to suggest disease is a widespread concern to Kentucky's wild turkey flock.
- Program Goals:
 - Monitor harvest in conjunction with hunter effort data gathered through surveys.
 - Enlist public cooperators for spring hunting logs, online post-season surveys, & summer brood surveys.
 - Continue turkey health surveillance.
 - Gather and disseminate to the public current research and news in turkey management.
 - Partner with KDFWR staff, NWTF, and universities to initiate research, habitat, and R3 projects as funds become available.

Table 1. 2018 spring turkey harvest compared to last season, averages for periodic intervals, and the annual rate of change. Harvest in Week 3 of the regular season was up (*italics*).

Turkeys Harvested		% Change from Period Average			
Category	2018	1-year (2017)	5-year (2014-2018)	10-year (2009-2018)	Annual Rate of Change (2009-2018)
Total Spring Harvest	27,151	-18%	-11%	-14%	-0.6%
Youth Season	1,102	-35%	-36%	-2%	-3.5%
Regular Season (23 days)	26,022	-18%	-9%	-12%	-0.4%
Opening Weekend	7,194	-31%	-20%	-23%	0.8%
Remaining 21 Days	18,828	-9%	-5%	-7%	-0.8%
1st Week	13,185	-14%	-49%	-49%	-0.1%
2nd Week	6,053	-1%	-2%	-3%	-0.6%
3rd Week	4,572	<i>9%</i>	<i>4%</i>	<i>5%</i>	<i>0.4%</i>
4th Week	2,212	-12%	-11%	-16%	-2.7%
1st District	3,035	-25%	-14%	-15%	-0.7%
2nd District	4,479	-20%	-13%	-17%	-0.6%
3rd District	1,415	-20%	-15%	-20%	-1.8%
4th District	4,897	-9%	-7%	-11%	-0.4%
5th District	2,642	-19%	-14%	-18%	-2.1%
6th District	2,925	-15%	-10%	-13%	-0.6%
7th District	2,336	-21%	-11%	-14%	-0.1%
8th District	2,757	-18%	-4%	-4%	-0.2%
9th District	2,725	-16%	-10%	-10%	0.7%
Bluegrass Region	5,812	-16%	-10%	-14%	-1.1%
Green River Region	7,795	-17%	-12%	-18%	-0.9%
Northeast Region	3,920	-20%	-6%	-8%	-0.4%
Purchase Region	3,035	-25%	-14%	-15%	-0.7%
Southeast Region	6,649	-15%	-9%	-11%	0.0%

Table 2. National Weather Service weather data indicate April 2018 was the 4th coldest year on record for Kentucky. This likely reduced hunting effort and delayed turkey breeding activity.

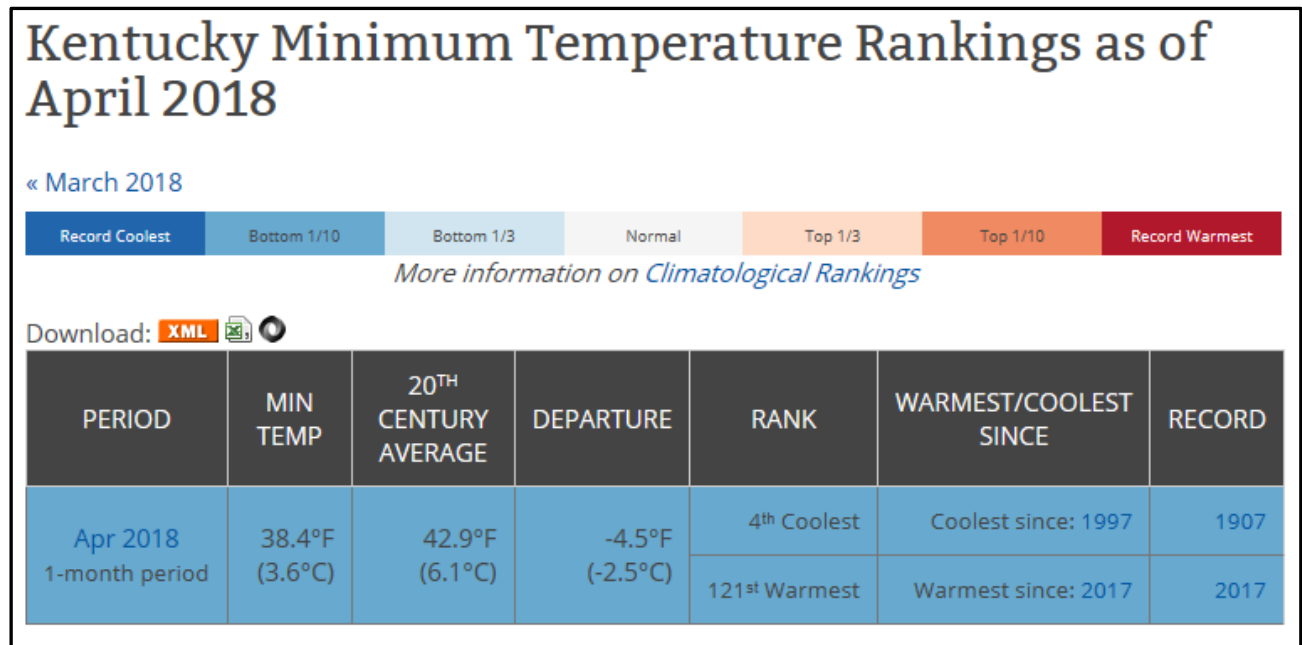


Table 5. 2018 spring turkey harvest by land ownership, license type, and age/sex of turkeys harvested. Statewide licenses include spring resident and nonresident turkey permits, youth resident and nonresident permits, and resident-only sportsman’s licenses (includes spring & fall permits). Landowners are license-exempt. (Data on harvest by residents vs. nonresidents were not available at time of publication.)

Turkeys Harvested	Land Ownership		License Type			Turkey Age/Sex			Total
	Private	Public	Land owner	Senior or Disabled	Statewide or Youth Under 12	Gobblers	Jakes	Hens	
	25,732	1,479	2,731	2,338	22,142	23,667	3,286	257	27,151
%	95%	5%	10%	9%	81%	87%	12%	1%	100%

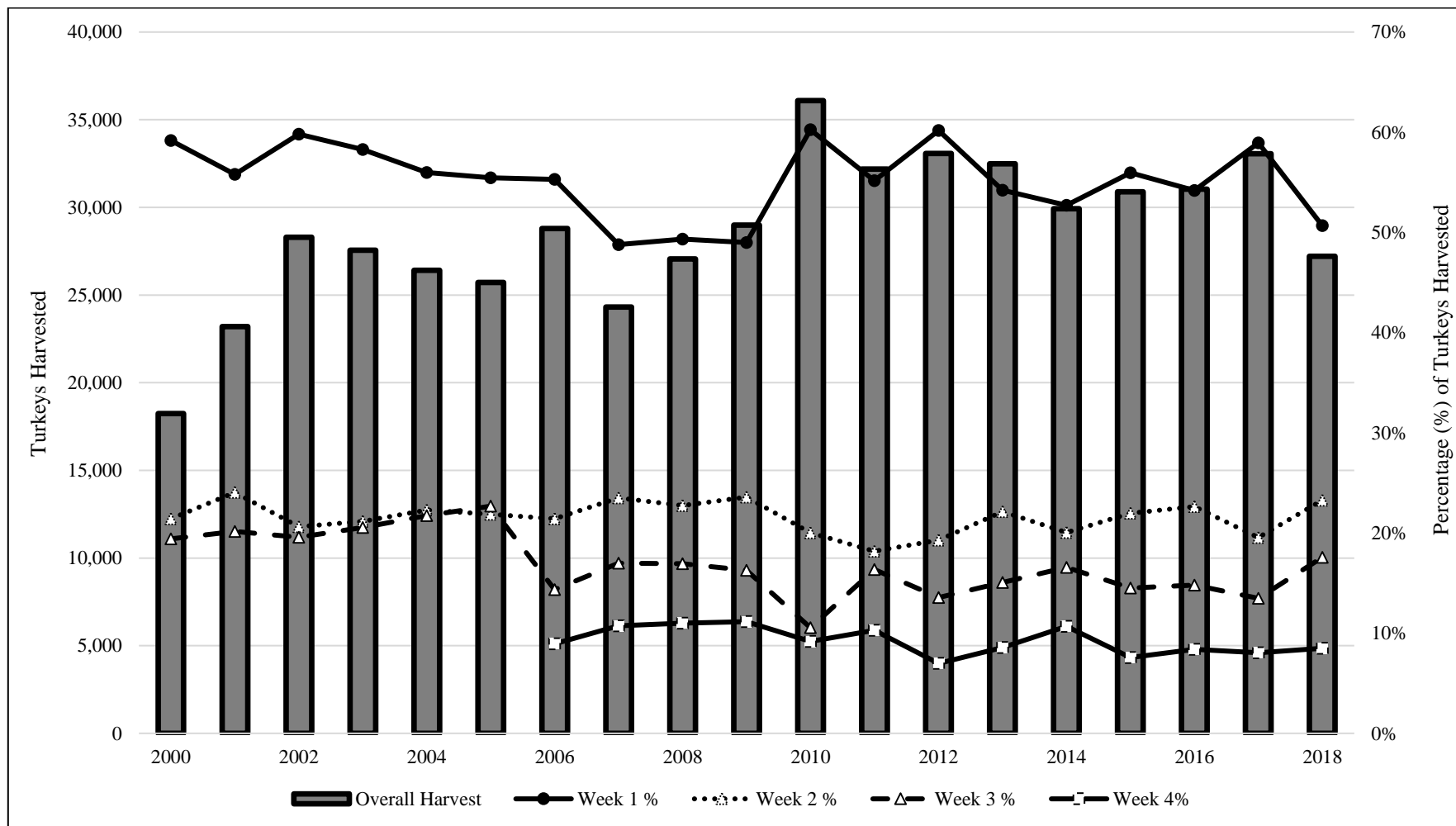


Figure 1. Kentucky spring turkey harvest, 2000-2018 (Telecheck era). Bars and left y-axis (vertical text) show turkeys harvested; lines and right y-axis (vertical text) show percentage of turkeys harvested by week of the regular season.

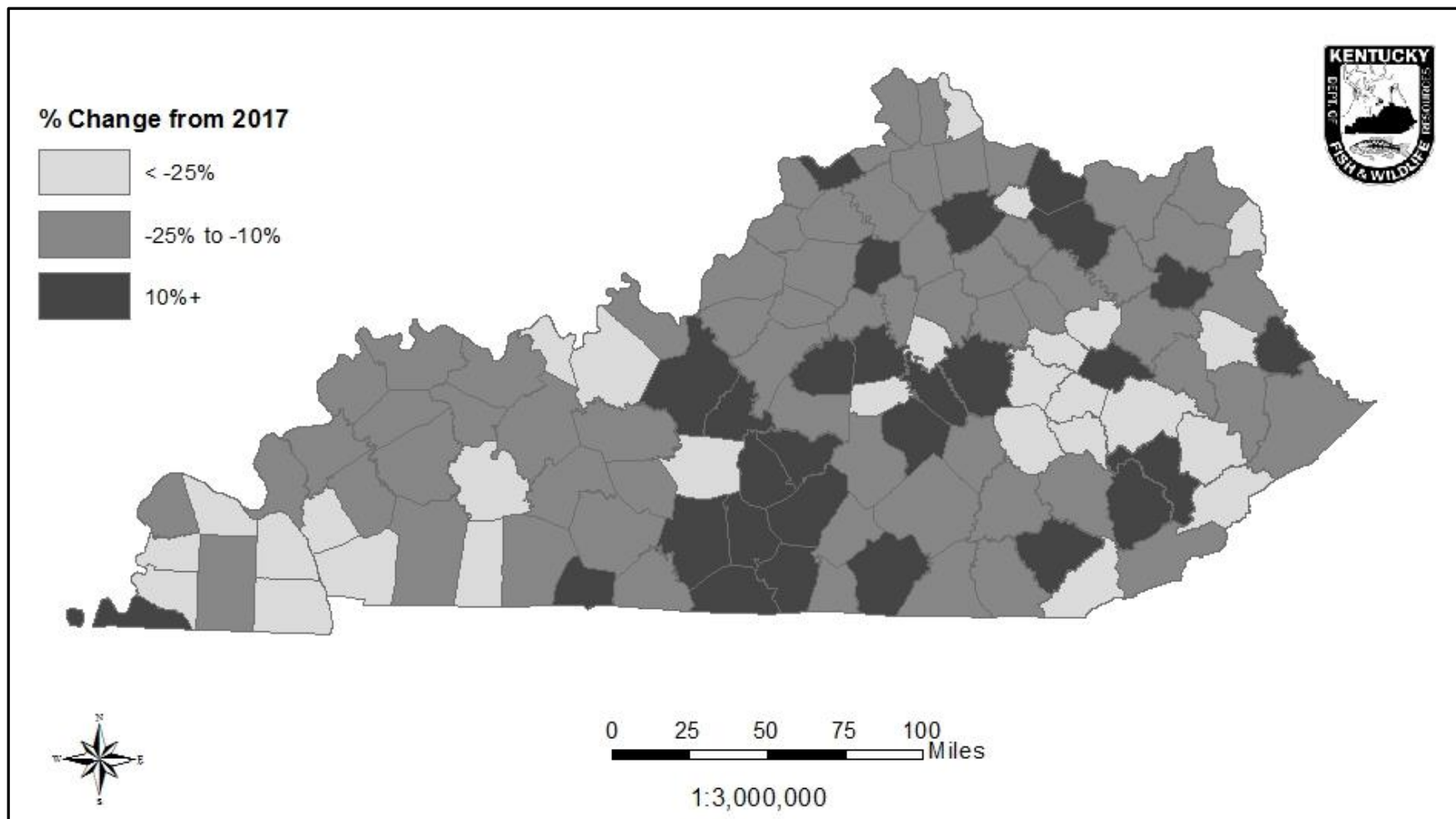


Figure 2. Percentage change in spring turkey harvest from 2017 to 2018 by county.

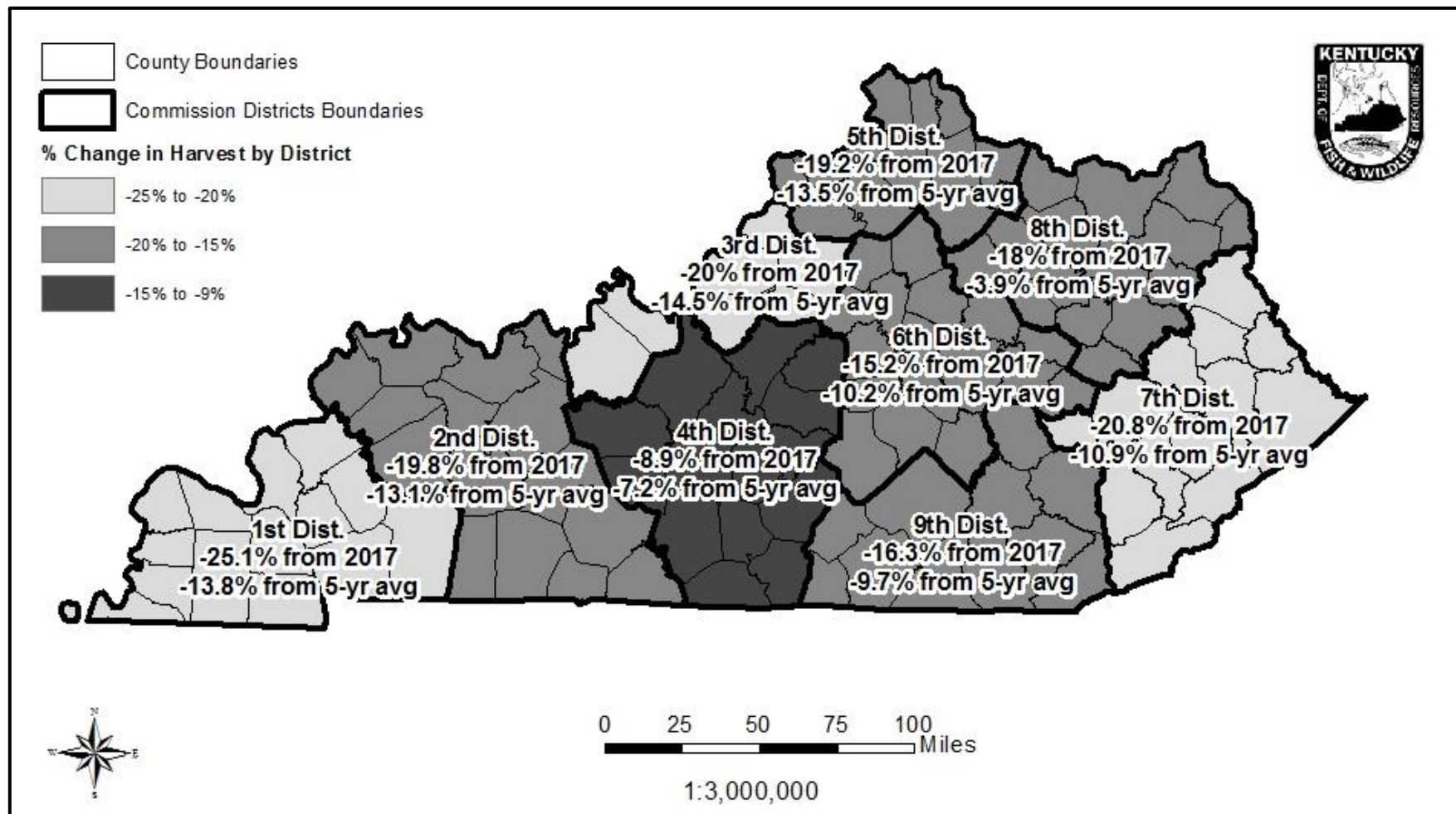


Figure 3. Percentage change in 2018 spring turkey harvest from 2017 and the 5-year average by KDFWR commission district.

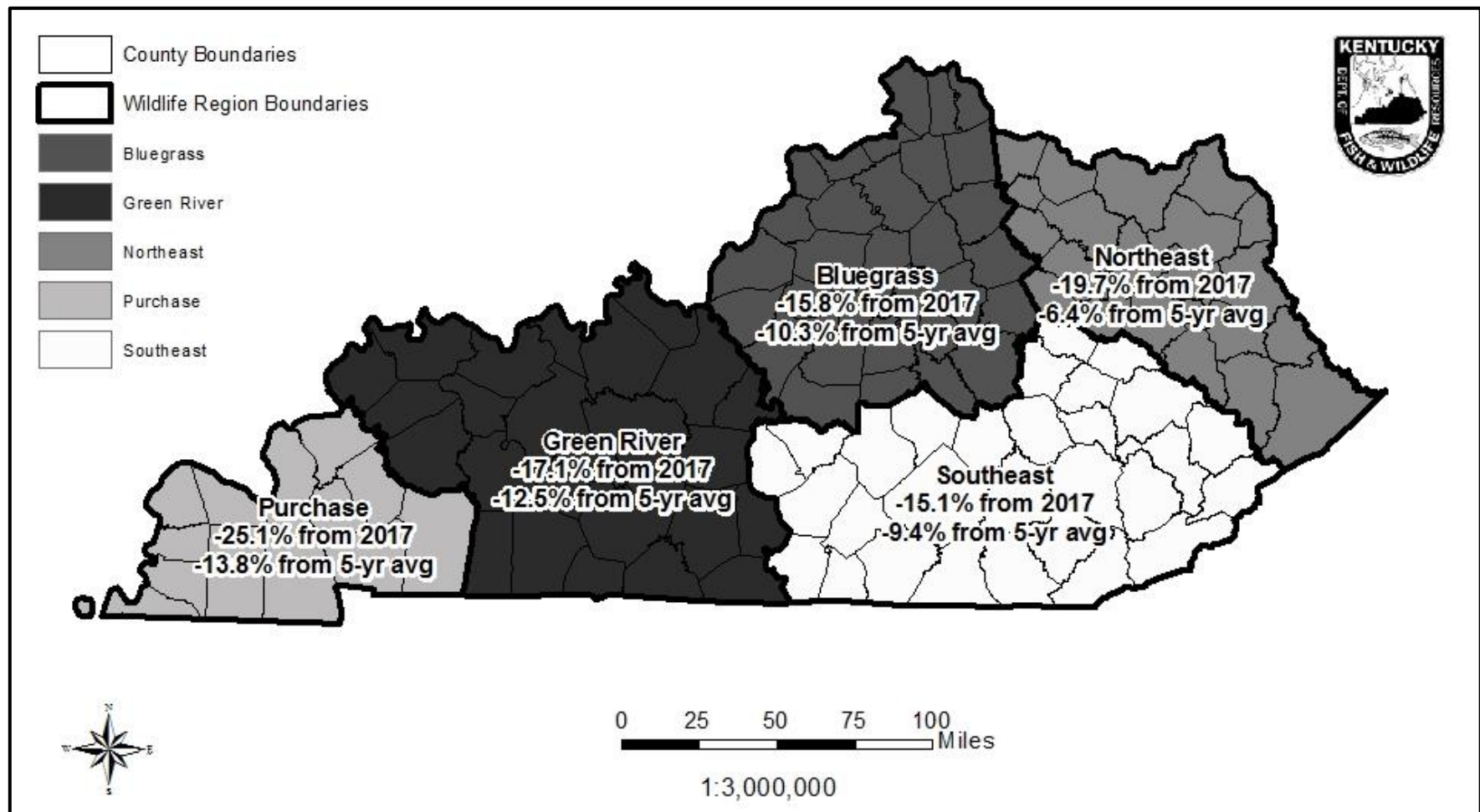


Figure 4. Percentage change in 2018 spring turkey harvest from 2017 and the 5-year average by KDFWR wildlife division region.

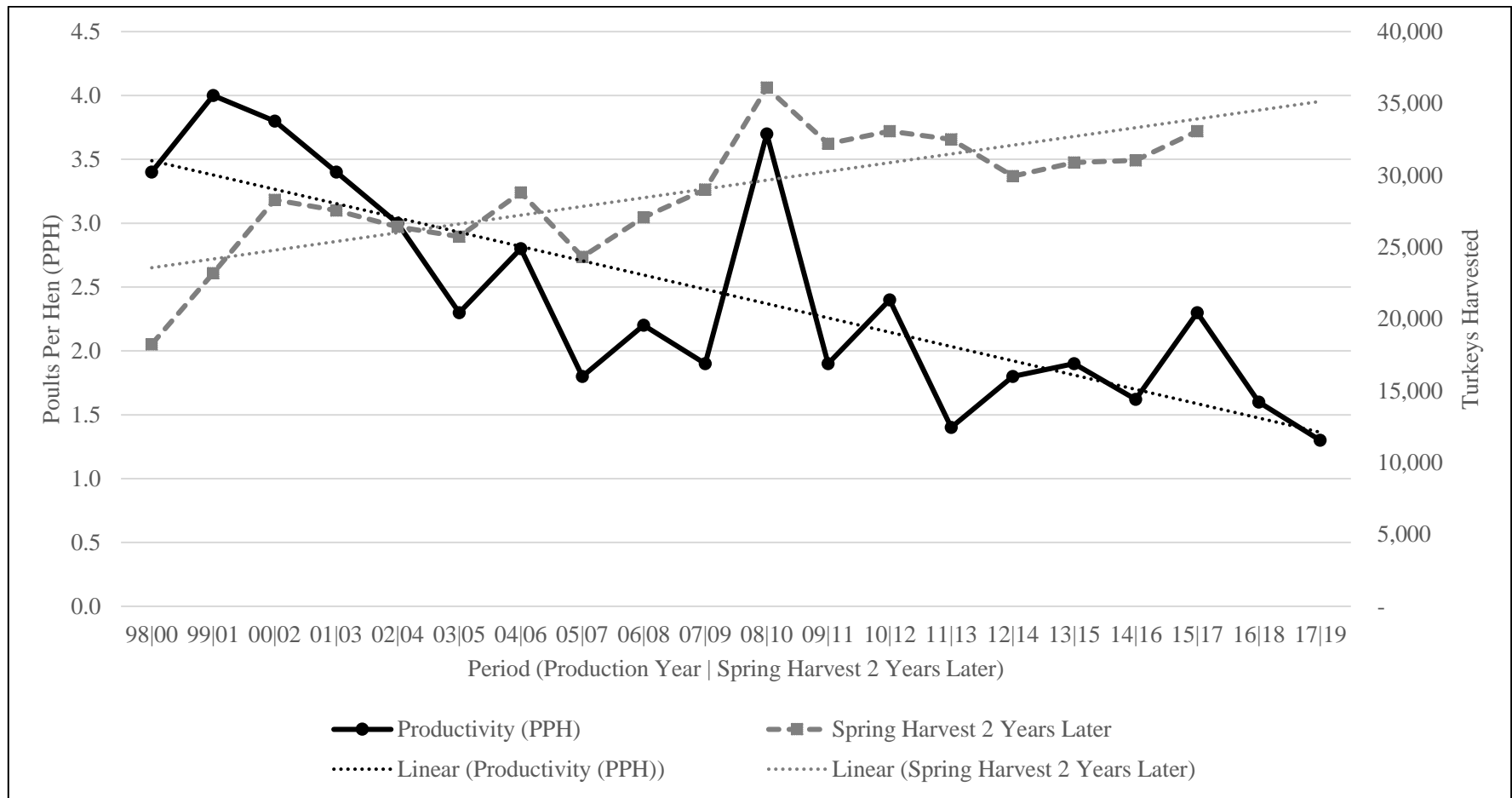


Figure 5. Kentucky spring turkey harvest and reproduction, 1998-2017. Reproduction is indexed by the Poults Per Hen ratio calculated from a summer brood survey by KDFWR staff and volunteers. Time periods on x-axis are a combination of the year reproduction and spring harvest two years later.

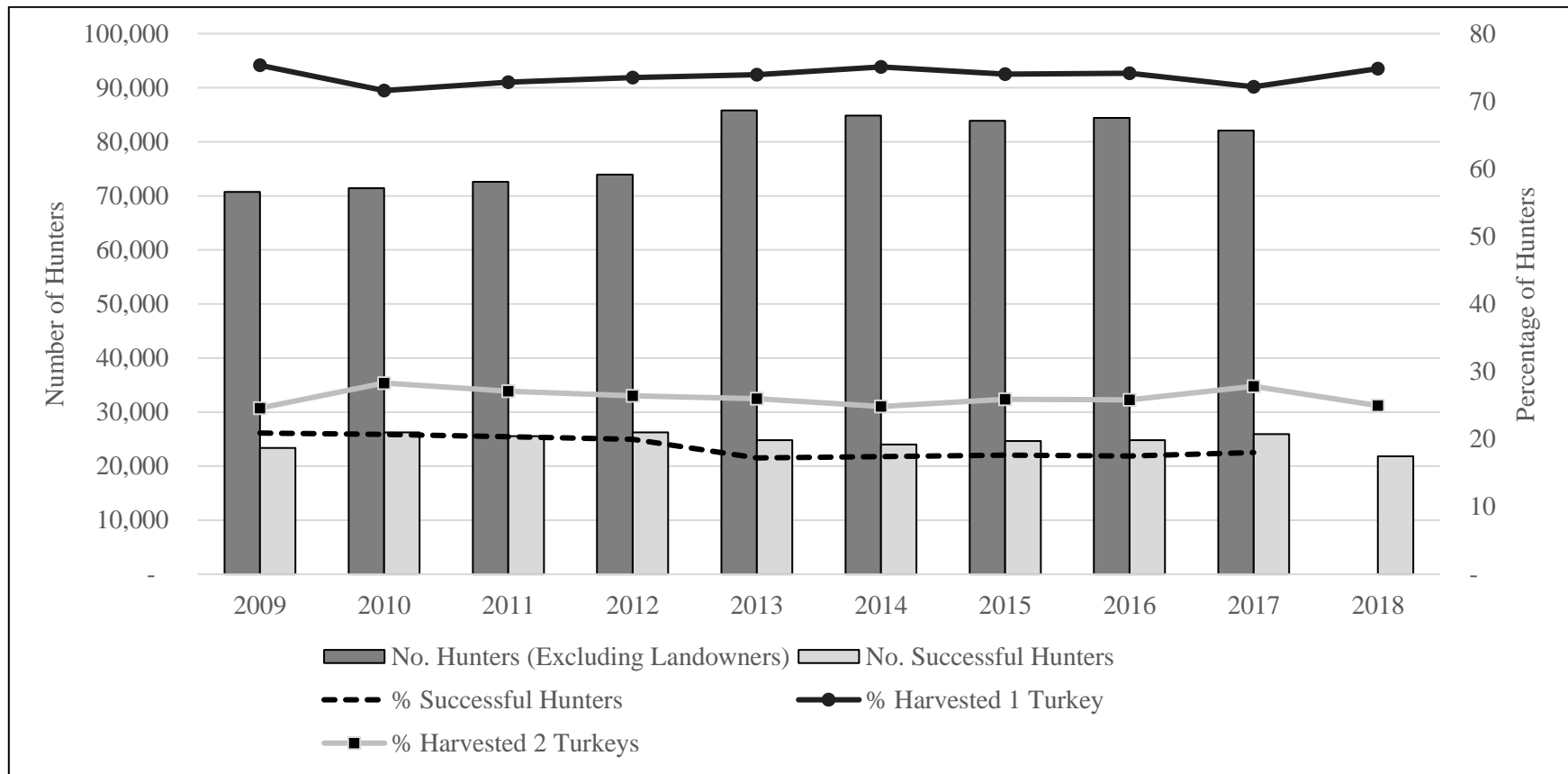


Figure 6. Ten-year trends in number of permitted hunters (except landowners), number and percentage of successful hunters (harvested at least 1 turkey), and percentage of hunters that harvested 1 turkey versus 2 turkeys. Number of hunters includes those who purchased a statewide spring turkey hunting permit (residents and nonresidents, and youth 12-15 and adults) with an annual hunting license, a senior/disabled license, or a resident sportsman's or resident youth sportsman's license.

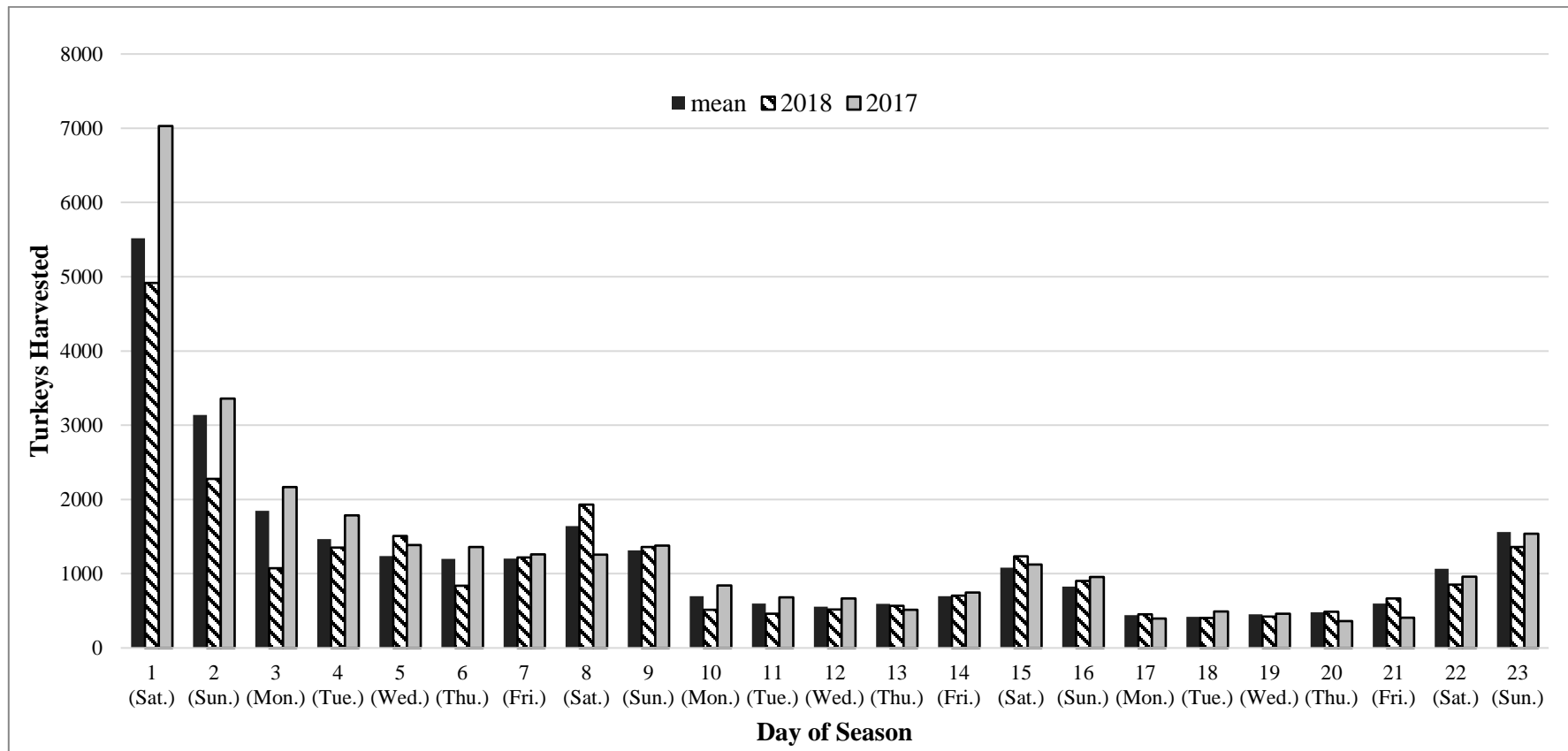


Figure 7. Spring turkey harvest by day of season, 2006-2018. Season length (23 days) and timing (Saturday closest to April 15) have been consistent during this period.

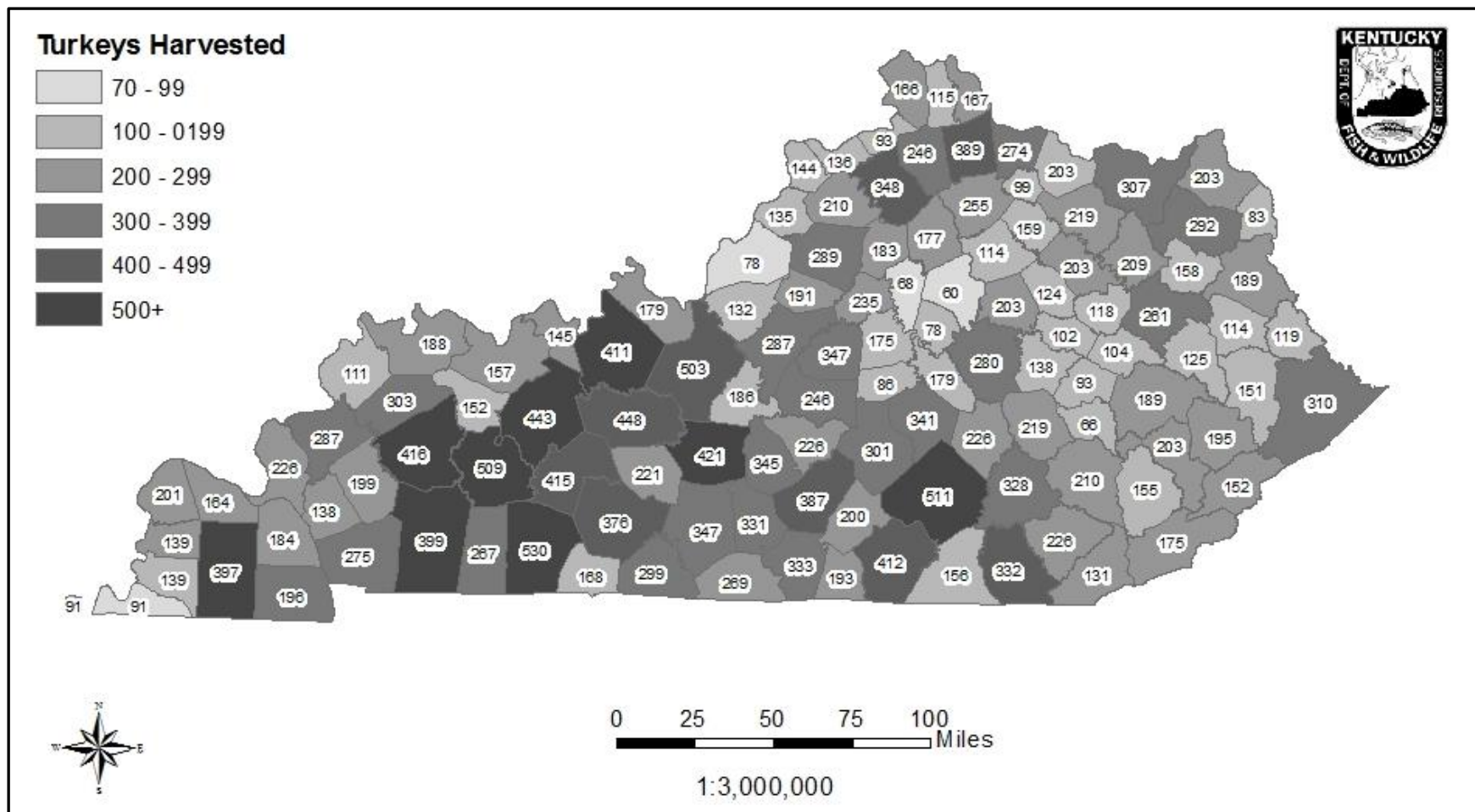


Figure 8. Spring turkey harvest by county, 2018.

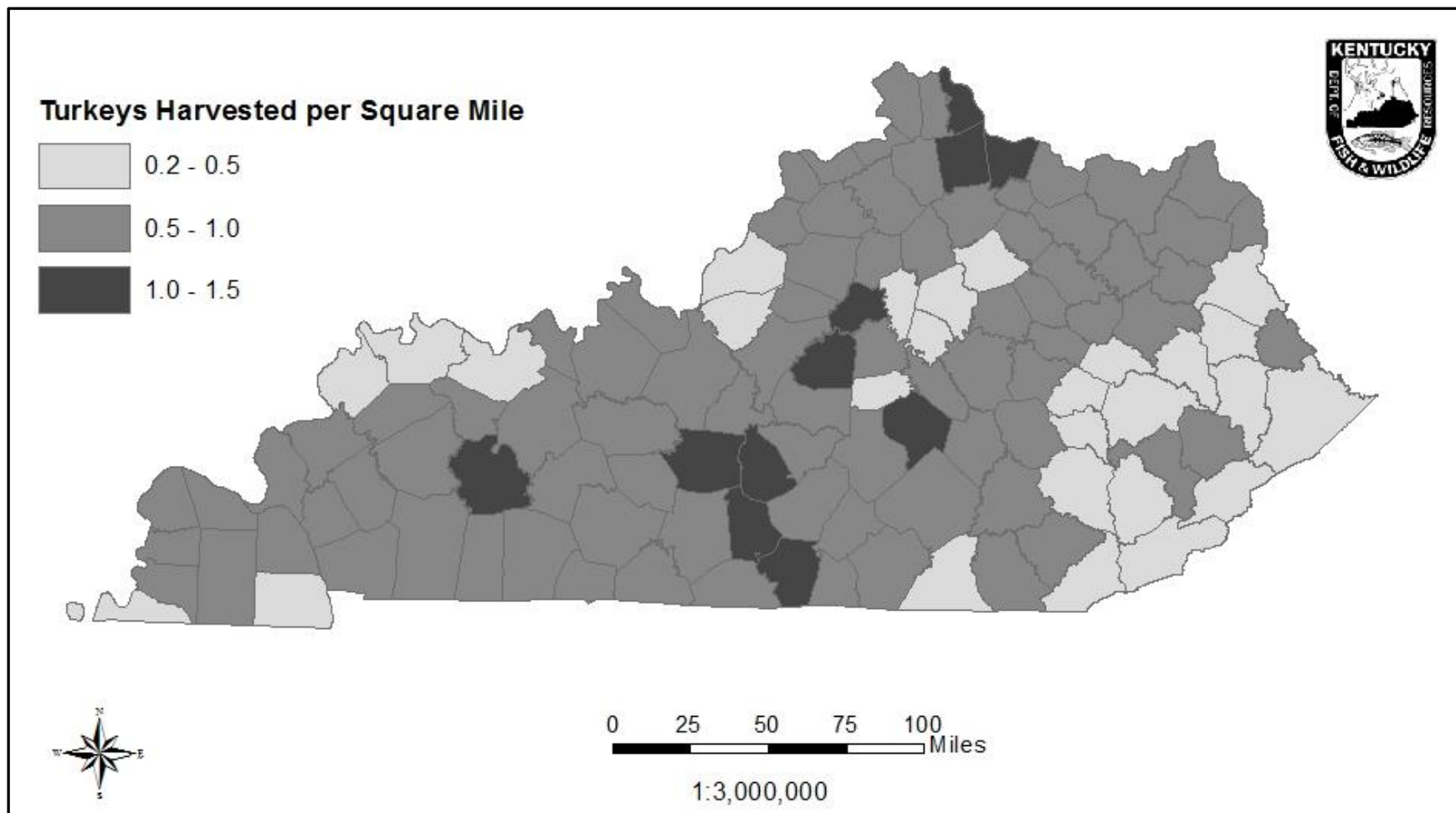


Figure 9. Spring turkey harvest density by county, 2018.

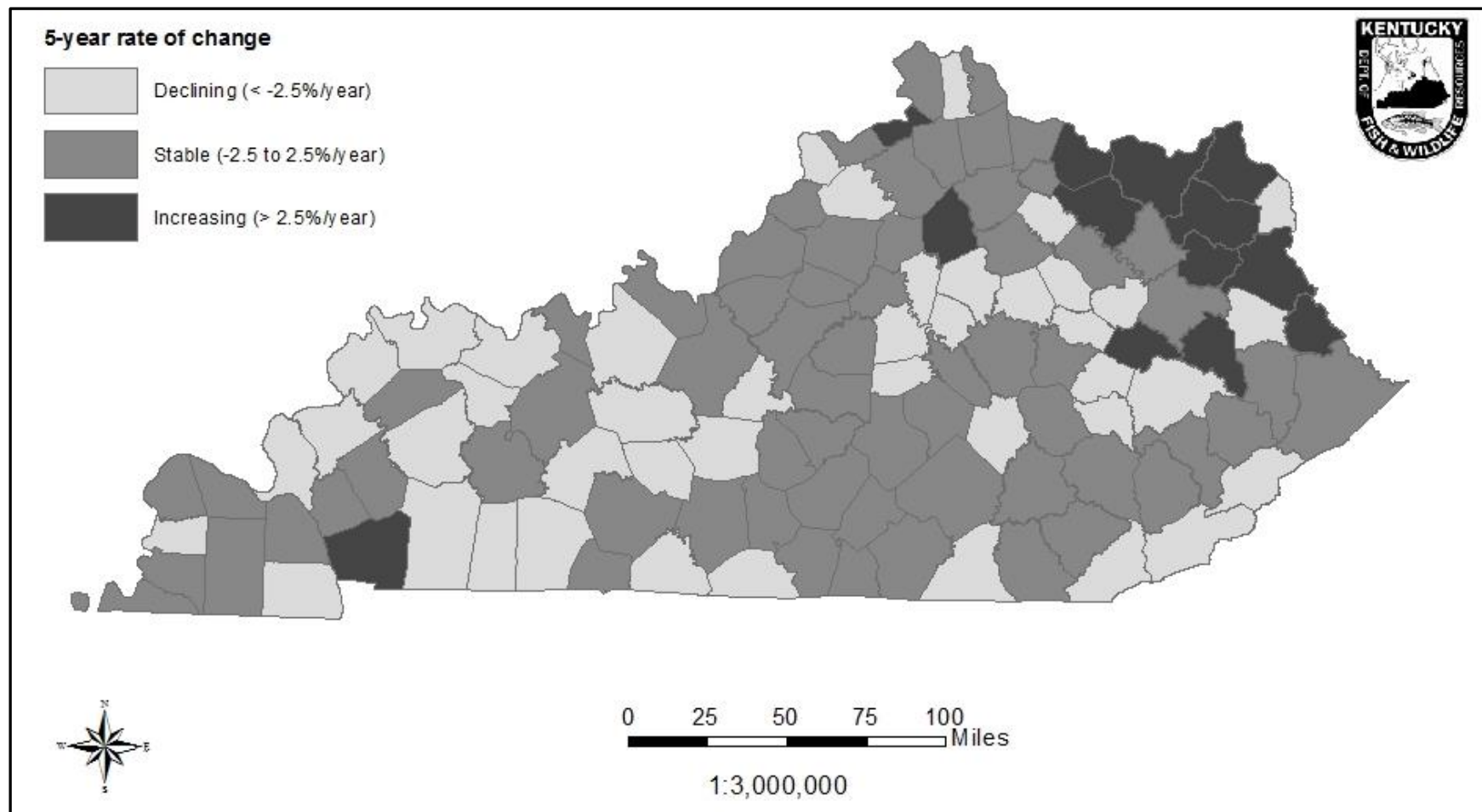


Figure 10. 5-year rate of change in spring turkey harvest by county, 2014-2018.

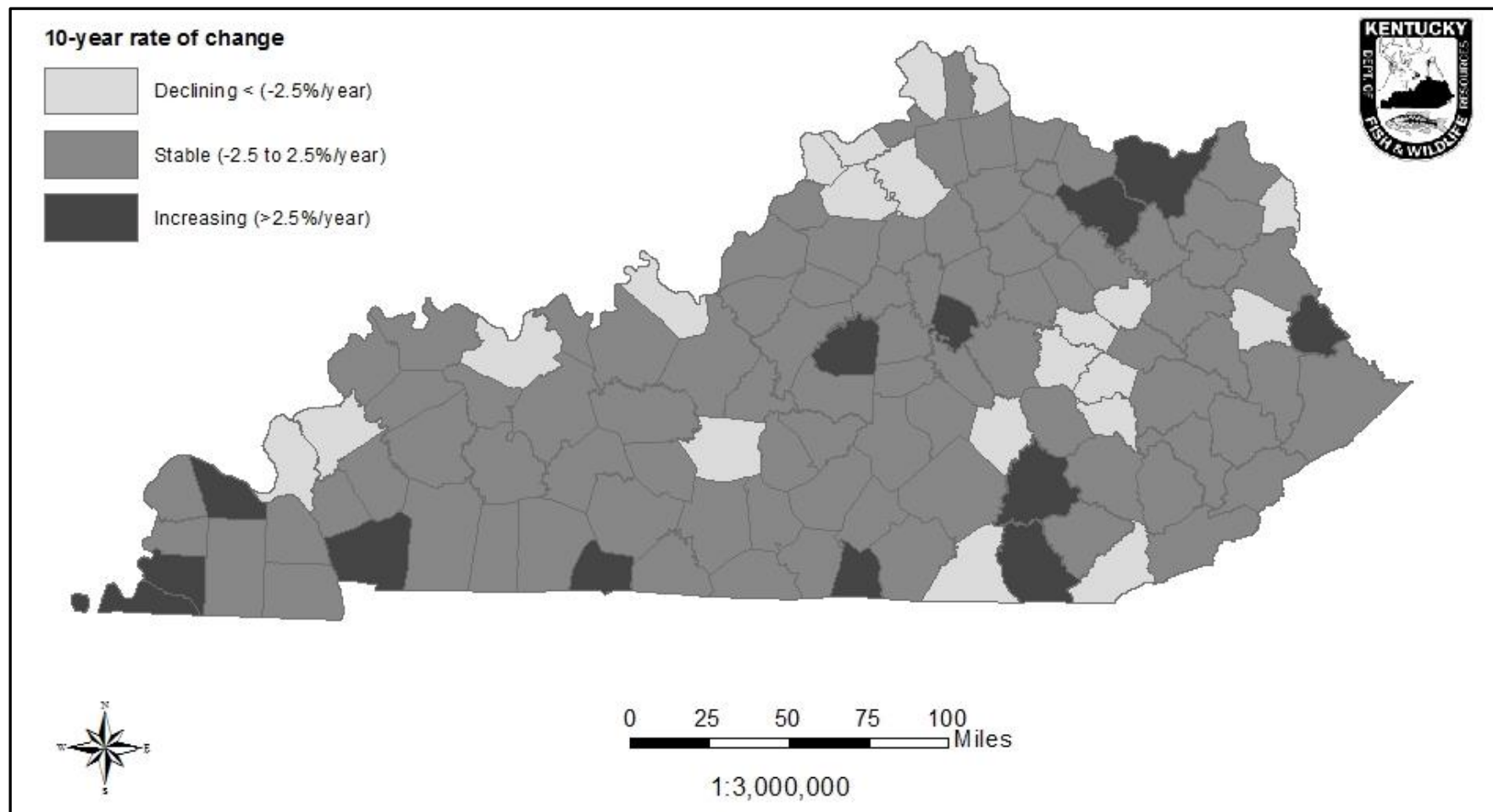


Figure 11. 10-year rate of change in spring turkey harvest by county, 2009-2018.

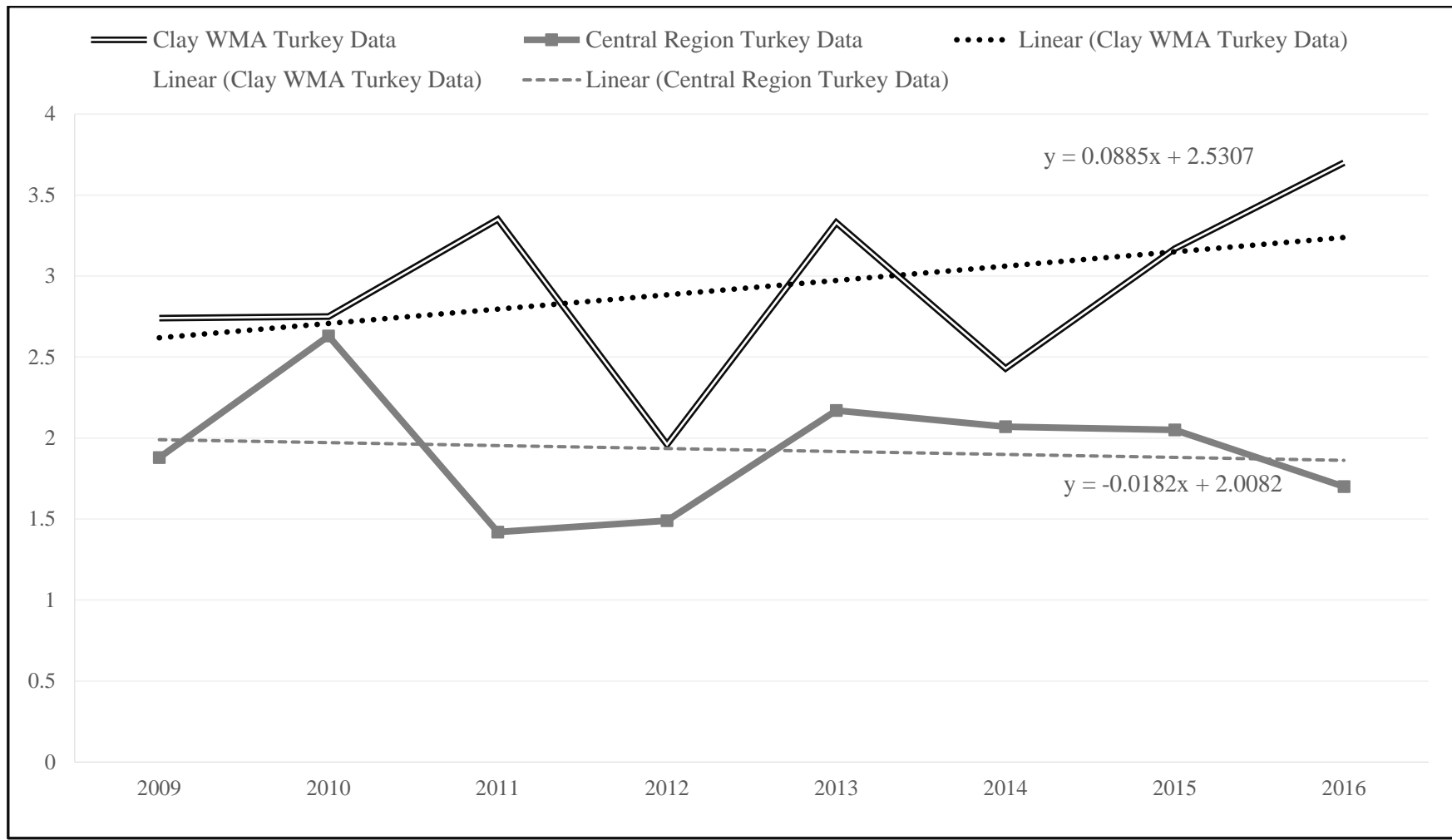


Figure 12. Trend in reproduction at Clay WMA in Nicholas County compared to the central region. Clay is a KDFWR Focus Area for quail management, and intensive efforts have improved local nesting and brood-rearing habitat compared to the typical nearby farm.

APPENDIX A. Turkey Health Concerns

Turkey populations have declined in some counties, but despite widespread speculation we have no evidence that disease is causing or related to current population declines. Each year some diseases may occur across the state, usually in isolated areas or certain counties. While there may be potential for population impacts from a few diseases, weather and habitat are more influential because they affect turkey population dynamics. The following summarizes a few diseases.

- *Avian Pox*: Caused by viruses transmitted by mosquitos. Many infected turkeys do not show signs while some develop lesions on unfeathered areas, the oral cavity, or the upper respiratory tract, that may impair vision or breathing and/or cause emaciation. Detrimental to turkeys, quail, and grouse. Considered a major infectious disease of turkeys in the southeast.
- *Histomoniasis (blackhead)*: Caused by the protozoan parasite *Histomonas meleagridis* transmitted in the eggs of the nematode worm *Heterakis gallinarum* found in the intestine of chickens and pheasants. When worm eggs are shed in droppings, worm larvae and the histomonads inside are deposited on the soil and may be taken up by earthworms. Turkeys, grouse, and quail that ingest contaminated soil or earthworms may become infected with histomoniasis. Infected turkeys may be listless and stand with drooped wings and ruffled feathers. Lesions in the intestines and liver that result in tissue damage. May cause mortality rates exceeding 75%.
 - Past research by the Tennessee Wildlife Resources Agency and the University of Tennessee evaluated 218 hunter-harvested birds analyzed, only 3 (1.4%) of which showed DNA evidence of blackhead. Population impacts of this and other diseases could not be determined. In a companion lab study, of 24 domestic Eastern wild turkey poults raised on freshly collected chicken litter from one poultry house, 2 (8.3%) tested positive for blackhead. Results only indicated a possible pathway for transmission. Further research is needed before definitive statements can be made. Such research is underway as part of a multi-year, multi-faceted turkey project, which will provide a comprehensive look at turkey survival, reproduction and other factors affecting population trends in middle Tennessee
- *Lymphoproliferative Disease*: Caused by a virus. Produces lymphoid tumors and outward symptoms characteristic of avian pox. Testing detected LPDV in 47% of turkeys in each of 18 states that submitted samples, including Kentucky. Existing evidence suggests LPDV infection is widespread in wild turkeys, but tumors are rare. Turkey fatality from LPDV is relatively rare.
- *Avian Influenza*: Caused by a virus that can affect poultry and is carried by free-flying waterfowl. In April 2015, the USDA confirmed the presence of highly pathogenic H5N2 AI in a goose and duck in McCracken County, KY. While AI is highly contagious with high mortality rates in domestic turkeys, this disease has never been documented in wild turkeys. Transmission from wild waterfowl to wild turkeys is considered unlikely due to differences in habitat selection and use.
- *West Nile Virus*: Caused by a virus and transmitted by a specific type of mosquito. Causes only a mild reaction in turkeys followed by a rapid immune response. Current research suggests that WNV lacks potential to be a major new disease of turkeys and that turkeys will not be a significant amplifying host for infecting mosquitoes.

APPENDIX B. 2018 spring turkey harvest by county.

Turkeys Harvested		% Change from Period Average			
County	2018	1-year (2017)	5-year (2014- 2018)	10-year (2009-2018)	Annual Rate of Change (2009- 2018)
Adair	387	-10%	-5%	-2%	1%
Allen	299	-11%	-10%	-21%	-1%
Anderson	235	-13%	-7%	-16%	-2%
Ballard	201	-19%	-2%	6%	2%
Barren	347	-4%	0%	-2%	2%
Bath	203	-16%	-1%	0%	2%
Bell	131	-40%	-32%	-36%	-4%
Boone	166	-21%	-18%	-27%	-4%
Bourbon	114	-15%	-10%	-2%	1%
Boyd	83	-48%	-23%	-31%	-4%
Boyle	86	-29%	-18%	-17%	0%
Bracken	274	-15%	-12%	-10%	-1%
Breathitt	189	-26%	-18%	-26%	-2%
Breckinridge	411	-26%	-20%	-23%	-1%
Bullitt	132	-15%	-9%	-14%	-2%
Butler	415	-14%	-11%	-17%	-2%
Caldwell	199	-22%	-18%	-25%	-2%
Calloway	196	-37%	-23%	-26%	-2%
Campbell	167	-33%	-20%	-22%	-3%
Carlisle	139	-34%	-21%	-21%	-2%
Carroll	136	-3%	3%	-10%	-3%
Carter	292	-21%	1%	-1%	-1%
Casey	301	-12%	-10%	-9%	0%
Christian	399	-21%	-16%	-12%	2%
Clark	203	-13%	-14%	-14%	1%
Clay	210	-11%	-7%	-10%	1%
Clinton	193	-13%	-5%	-1%	3%
Crittenden	287	-24%	-21%	-35%	-4%
Cumberland	333	-7%	-4%	-5%	1%
Daviess	157	-24%	-16%	-28%	-3%
Edmonson	221	-21%	-17%	-23%	-1%
Elliott	158	-10%	-2%	-4%	1%
Estill	138	-31%	-24%	-31%	-3%
Fayette	60	-15%	-12%	-6%	2%
Fleming	219	-6%	7%	18%	3%
Floyd	151	-21%	-12%	-12%	1%

Franklin	183	-10%	-4%	-3%	1%
Turkeys Harvested		% Change from Period Average			
County	2018	1-year (2017)	5-year (2014- 2018)	10-year (2009-2018)	Annual Rate of Change (2009- 2018)
Fulton	91	9%	10%	25%	4%
Gallatin	93	-11%	7%	1%	-1%
Garrard	179	-7%	-4%	-12%	0%
Grant	246	-22%	-12%	-11%	0%
Graves	397	-24%	-6%	-9%	-1%
Grayson	448	-11%	-15%	-20%	-1%
Green	345	1%	3%	-4%	0%
Greenup	203	-17%	6%	10%	2%
Hancock	145	-29%	-10%	-13%	-1%
Hardin	503	5%	-1%	-15%	-2%
Harlan	175	-24%	-15%	-13%	0%
Harrison	255	-6%	-1%	0%	2%
Hart	421	-31%	-22%	-29%	-3%
Henderson	188	-25%	-16%	-15%	0%
Henry	210	-21%	-25%	-34%	-3%
Hickman	139	-28%	-9%	3%	3%
Hopkins	416	-24%	-14%	-16%	1%
Jackson	219	-26%	-12%	-12%	0%
Jefferson	78	-14%	-11%	-17%	-1%
Jessamine	78	-31%	-18%	-14%	3%
Johnson	114	-40%	-26%	-35%	-3%
Kenton	115	-18%	-15%	-16%	-2%
Knott	195	-27%	-13%	-14%	0%
Knox	226	-6%	-7%	-4%	2%
LaRue	186	-5%	-10%	-20%	-2%
Laurel	328	-17%	-10%	-4%	4%
Lawrence	189	-24%	-8%	-20%	-2%
Lee	93	-39%	-23%	-30%	-3%
Leslie	155	12%	4%	-4%	1%
Letcher	152	-26%	-22%	-23%	-1%
Lewis	307	-22%	3%	12%	4%
Lincoln	341	-2%	0%	0%	1%
Livingston	226	-24%	-20%	-30%	-3%
Logan	530	-21%	-17%	-20%	0%
Lyon	138	-37%	-20%	-15%	1%
Madison	280	-10%	-8%	-12%	0%
Magoffin	125	-21%	5%	-2%	0%

Marion	246	-23%	-11%	-11%	0%
Marshall	184	-27%	-8%	-8%	1%
Turkeys Harvested		% Change from Period Average			
County	2018	1-year (2017)	5-year (2014- 2018)	10-year (2009-2018)	Annual Rate of Change (2009- 2018)
Martin	119	-10%	1%	6%	3%
Mason	203	13%	14%	13%	0%
McCracken	164	-28%	-10%	-6%	3%
McCreary	156	-21%	-18%	-30%	-3%
McLean	152	-23%	-13%	-26%	-2%
Meade	179	-25%	-19%	-27%	-3%
Menifee	118	-28%	-22%	-31%	-3%
Mercer	175	-6%	-7%	-6%	0%
Metcalfe	331	-3%	3%	3%	1%
Monroe	269	2%	-10%	-18%	-1%
Montgomery	124	-21%	-14%	-15%	-1%
Morgan	261	-23%	-12%	-18%	-2%
Muhlenberg	509	-26%	-13%	-17%	0%
Nelson	287	-15%	-10%	-11%	-1%
Nicholas	159	-21%	-13%	-13%	-2%
Ohio	443	-21%	-13%	-15%	-1%
Oldham	135	-16%	-9%	-11%	0%
Owen	348	-24%	-14%	-22%	-3%
Owsley	66	-36%	-27%	-34%	-4%
Pendleton	389	-22%	-15%	-17%	-1%
Perry	203	-9%	-2%	-3%	2%
Pike	310	-22%	-11%	-10%	2%
Powell	102	-32%	-20%	-27%	-3%
Pulaski	511	-17%	-5%	-4%	1%
Robertson	99	-27%	-20%	-15%	-2%
Rockcastle	226	-19%	-17%	-27%	-3%
Rowan	209	-25%	-9%	-10%	-1%
Russell	200	-17%	-6%	-4%	2%
Scott	177	-17%	1%	-2%	0%
Shelby	289	-19%	-13%	-22%	-2%
Simpson	168	4%	-6%	4%	7%
Spencer	191	-14%	-9%	-19%	-2%
Taylor	226	-5%	-6%	-5%	1%
Todd	267	-26%	-19%	-20%	0%
Trigg	275	-27%	-10%	-1%	5%
Trimble	144	-20%	-18%	-29%	-4%

Union	111	-17%	-16%	-25%	-2%
Warren	376	-12%	-7%	-8%	1%
Washington	347	4%	5%	9%	4%
Turkeys Harvested		% Change from Period Average			
County	2018	1-year (2017)	5-year (2014- 2018)	10-year (2009-2018)	Annual Rate of Change (2009- 2018)
Wayne	412	-5%	-6%	-11%	1%
Webster	303	-25%	-14%	-18%	-1%
Whitley	332	-18%	-9%	0%	4%
Wolfe	104	-9%	-2%	-3%	1%
Woodford	68	-20%	-20%	-12%	2%

APPENDIX B. 2017 Summer Sighting/Brood Survey

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has conducted summer brood surveys since 1984. Survey participants traditionally included KDFWR personnel and volunteers, most of whom are members of the National Wild Turkey Federation. Participants record turkeys seen incidentally during their travels in July and August. The survey provides indices for tracking trends in turkey reproduction and hunting pressure, including a poult-per-hen (PPH) ratio that indicates overall productivity; a percentage of hens with poults that indicates nesting success; a poult-per-brood (PPB) ratio that indicates poult survival; and a gobbler-to-hen ratio that indicates gobbler carry-over after spring hunting.

Brood survey participation had declined over the past decade until last season, when we initiated outreach efforts to engage the public for more turkey observations (Figure 2). Outreach included press releases, emails to hunters and department staff outside the Wildlife Division, and advertisements on KDFWR radio and television programs and social media platforms.

In 2017, we changed procedures for recording and analyzing turkey observations to a standardized protocol developed by the Southeast Wild Turkey Working Group (a consortium of turkey program coordinators from member states in the Southeastern Association of Fish and Wildlife Agencies). We instructed participants to record (1) each observation of a turkey or turkeys as a distinct, individual event, regardless of sex or age of the turkey(s) seen; and (2) all turkey observations, even if the observer suspected she/he might have seen the turkey(s) before. Prior to data analysis, we censored observations with (1) $\geq 25\%$ of turkeys of unknown age and sex, (2) ≥ 8 hens but no poults, and (3) ≥ 1 hen and ≥ 1 poult in which the ratio of hens to poults

was < 0.0625 . For observations of poult with no hens, we inserted a value of 1 to reduce bias from brood hens not seen but likely nearby.

Compared to 10-year averages, in 2017 the number of survey participants increased 212% (from 78 to 159), observations of ≥ 1 turkey increased 370% (from 386 to 1,812), and total turkeys observed increased 183% (from 5,326 to 9,481; Figure 2). Observations were collected from 109 of 120 counties and ranged from 1 to 195 per county (Figure 3). We hope to maintain this high level of public participation each year.

The mean PPH index was 1.3 and did not vary markedly across western, central, and eastern regions of the state (Table 1). This was down from 1.6 in 2016 and 41% below the 10-year average (2008-2017) of 2.0, with 2.0 generally considered “break even” production. Just over half of all hens were observed with broods, varying regionally from 42% to 58%. Poults-per-brood was 3.4 overall, varying regionally from 2.5 to 3.8.

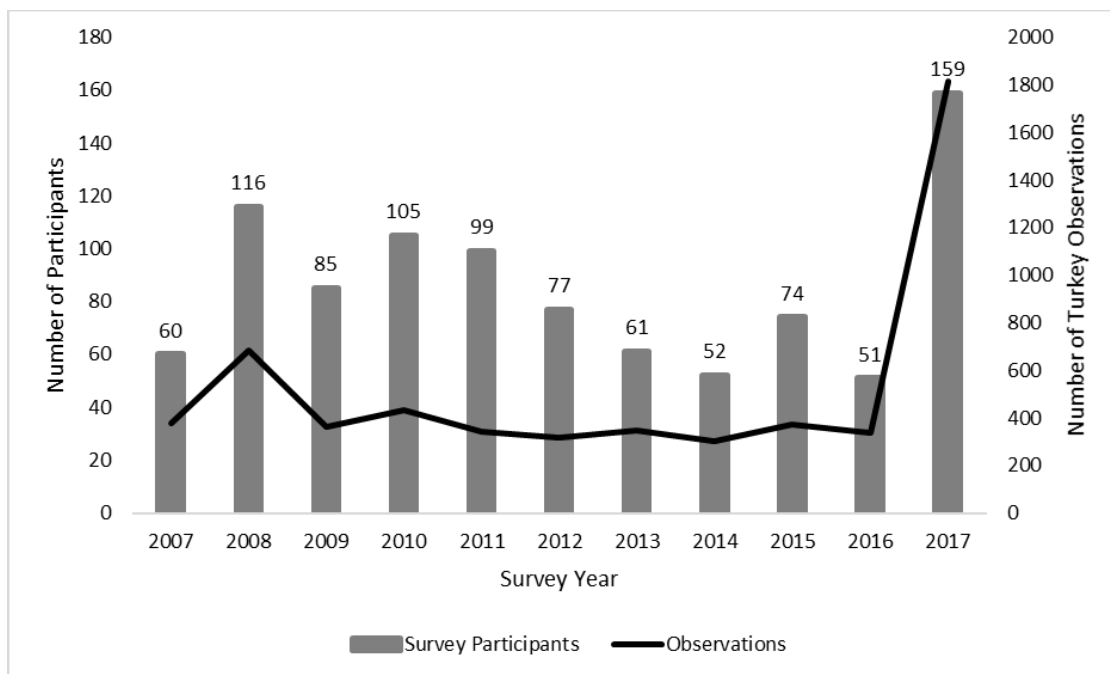


Figure 2. Number of participants (bars; left y-axis) and individual observations of ≥ 1 turkey (line; right y-axis) from KDFWR brood surveys conducted July and August, 2008-2017. Not shown are total turkeys observed across all observations, which increased 183% from (9,481) the 10-year average (5,326).

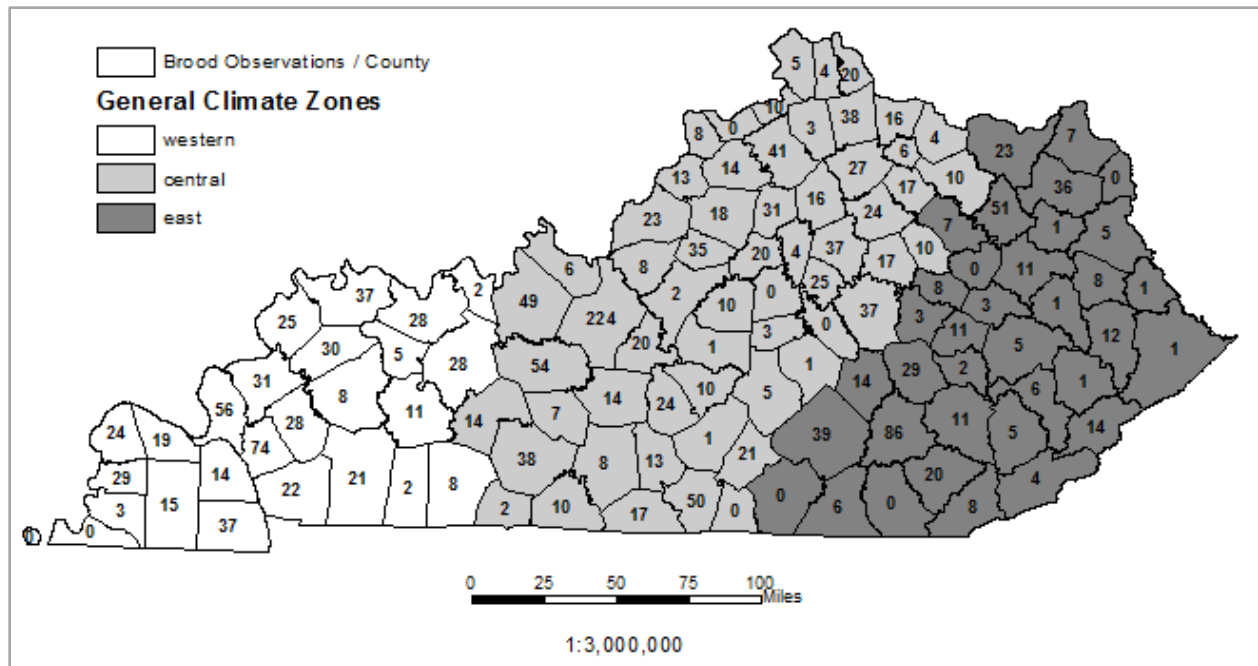


Figure 3. Wild turkey observations (i.e., ≥ 1 bird per sighting) by county from the KDFWR summer brood survey conducted by staff and volunteers in July and August, 2017. Regions reflect general differences in climate and land form, cover, and use.

Table 1. Data from Kentucky's wild turkey brood survey, 1 July – 31 August, 2017. Observers included KDFWR staff and members of the public.

Region	Hens	Poults	Males	Unknown	Total Turkeys	PPH^a (95% CIs)	PPB^b (95% CIs)	% Hens w/ Brood^c (n^d)	Male:Female Ratio^e (n^f)
Central	1,653	2,153	1,072	8	4,886	1.31 (1.16-1.45)	3.77 (3.53-4.01)	44.2 (691)	0.65 (941)
East	586	720	370	5	1,681	1.23 (1.04-1.41)	2.58 (2.29-2.91)	58.0 (258)	0.63 (363)
West	876	1,293	385	4	2,558	1.48 (1.29-1.67)	3.11 (2.84-3.39)	58.0 (333)	0.44 (431)
Statewide^g	3,141	4,216	1,837	28	9,222	1.34 (1.25-1.45)	3.32 (3.16-3.49)	51.1 (1,287)	0.58 (1,741)

^aPoults-per-hen (calculated by bootstrapping the sample).

^bPoults-per-brood (calculated by bootstrapping the sample).

^cPercentage of hens that were observed with ≥ 1 poult during survey.

^dNumber of observations where ≥ 1 hen was observed.

^eTotal number of males observed during survey divided by total number of females observed during survey.

^fNumber of observations where ≥ 1 hen or ≥ 1 male was observed during survey.

^gMay include observations in which region was not indicated in data file.

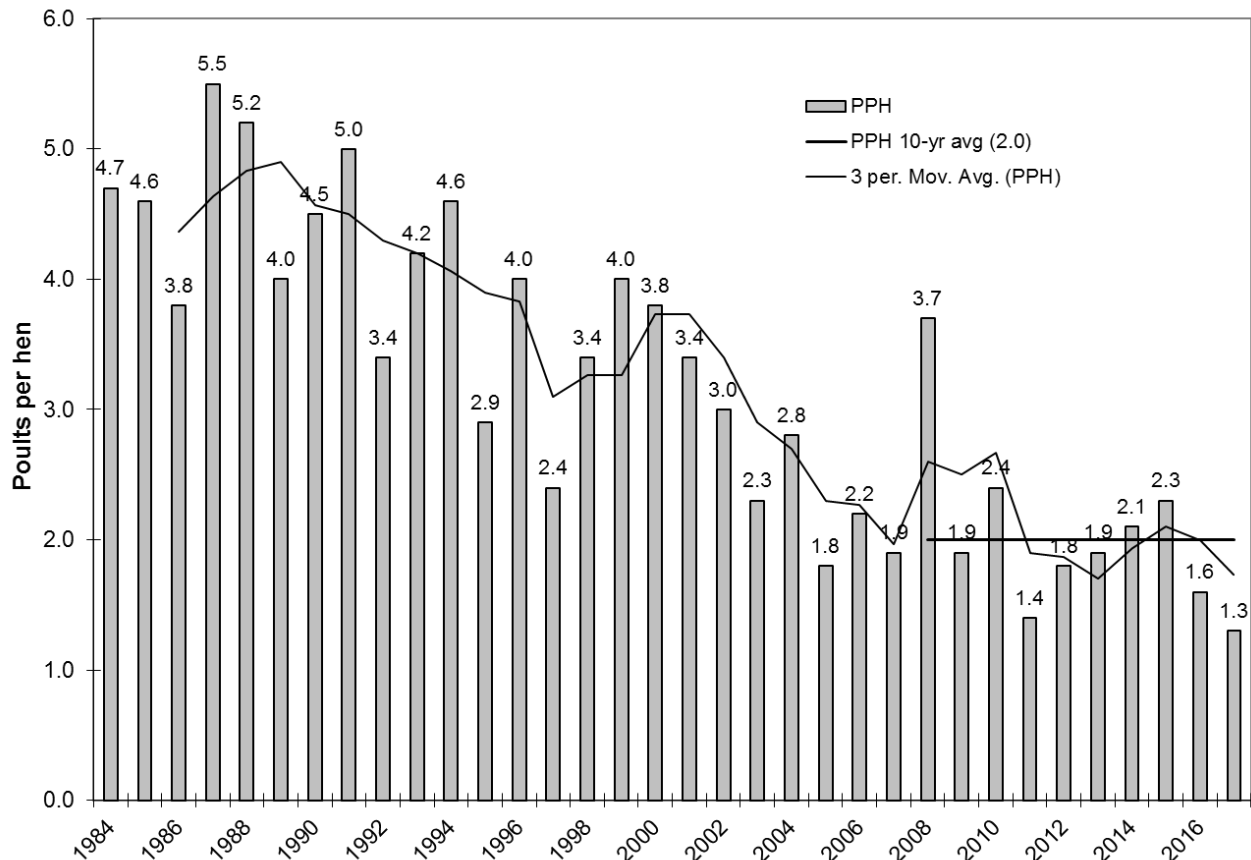


Figure 4. Poult-per-hen (PPH) ratios from brood surveys in Kentucky conducted July and August, 1984-2017. Three-year moving average (black line) and 10-year average (horizontal line) shown. PPH for 2017 may not be directly comparable to past years due to differences in survey participation and analysis methods (explained above).

Figure 5 below shows how turkey productivity compares with spring harvest, statewide, over the past 20 years. Notably, harvest has trended upward concurrent with production trending downward. This situation has been observed in several other states, leading some researchers to consider this evidence for a theory known as density dependence. Density dependence predicts a slowing of growth as a turkey population approaches or exceeds its habitat's carrying capacity, due to fewer resources being available to individual turkeys (e.g., fewer quality nesting sites for an increasing number of hens; i.e., lower per-capita productivity). Populations may overshoot carrying capacity, decline to appropriate levels the habitat can support, then eventually stabilize as the population fluctuates above and below some unknown carrying capacity over time.

Beyond the seemingly conflicting long-term trend, note that the last time turkey production declined in consecutive years was from 1999 to 2003 (Figure 5). Spring turkey harvest also declined over this period (2000 to 2003), so we may expect declines this spring or next. In 2004, productivity began to fluctuate despite being on a general downward trend. Harvest increased to a peak in 2010, and since has fluctuated at a slightly lower level. (The 2008 spike in PPH was due to excellent poult survival fueled by abundant food provided by a periodic cicada hatch in the eastern two-thirds of

Kentucky that summer, followed by a subsequent surplus of 2-year-old birds available for harvest two years later.)

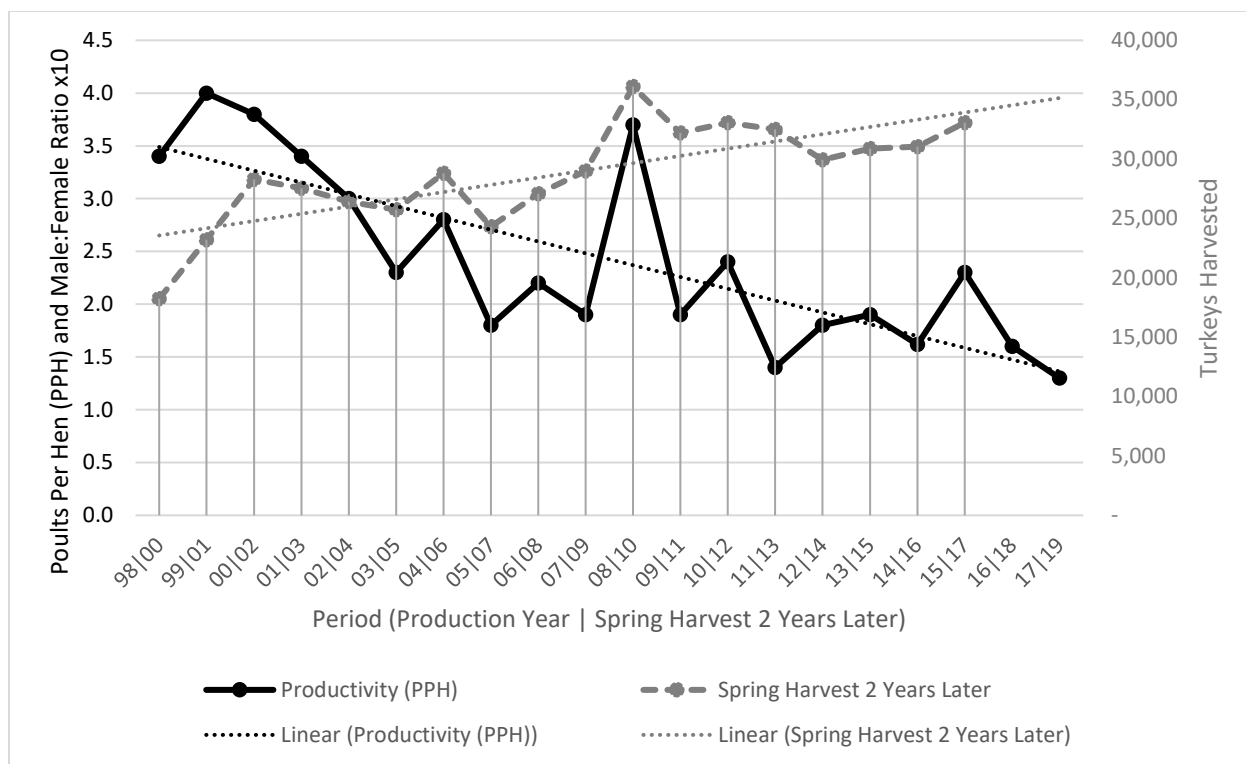


Figure 5. Relationship of turkey productivity (indexed by poult-per-hen ratio [PPH] from brood surveys) to spring turkey harvest, statewide, 2008-2017.

Last summer's male:female ratio averaged 0.6 statewide (Table 1) based on brood survey observations. Values of this index below 0.5 may indicate overly high hunting pressure. Gobbler carry-over to 2018 may have been enough to compensate for two consecutive years of poor production, at least in central and eastern regions that were above the 0.5 male:female threshold (0.7 and 0.6, respectively). In western counties gobbler carry-over was lower (male:female ratio 0.4), which when combined with two years of poor production, may result in lower harvest in 2018.